

Climate change could push bowhead whales to cross paths with shipping traffic

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In response to climate change, bowhead whales are changing their migratory patterns. That could put them at higher risk of ship strikes as sea-ice extent continues to decline and shipping traffic increases, according to new research in *Geophysical Research Letters*. Credit: NOAA

The population of bowhead whales that migrates between the Bering and Beaufort Seas each year is a conservation success story, with today's population nearing—if not exceeding—pre-commercial whaling numbers. But climate change is shifting the whales' feeding grounds and migration patterns, potentially pushing them to spend more time in the paths of oncoming ships, according to a new study [published](#) in the journal *Geophysical Research Letters*.

Researchers used more than a decade of acoustic data to monitor [bowhead whales'](#) movements between their usual overwintering grounds in the Bering Sea and summer feeding grounds in the Chukchi and Beaufort Seas. The whales departed the summer feeding grounds about six weeks later in 2022 than in 2008, based on the acoustic data.

Some are also spending winter farther north in the Chukchi Sea, where commercial traffic in particular has been increasing. That means they could be lingering longer in shipping lanes, which grow busier as sea ice shrinks.

"A shift like this may not necessarily be a bad thing for the whales, but any time we see more overlap with whales and shipping traffic, we should be concerned," said Angela Szesciorka, a marine scientist at Oregon State University's Marine Mammal Institute who led the study. "There will be winners and losers, but only time will tell."

Whales on the move

Historically, the population of bowhead whales that Szesciorka studies has spent their winters in the Bering Sea. In April, they'd head north through the Chukchi Sea and into the Beaufort Sea off the Canadian and Alaska coasts, head west to the Russian Chukotka Peninsula, and finally go back south around mid-November.

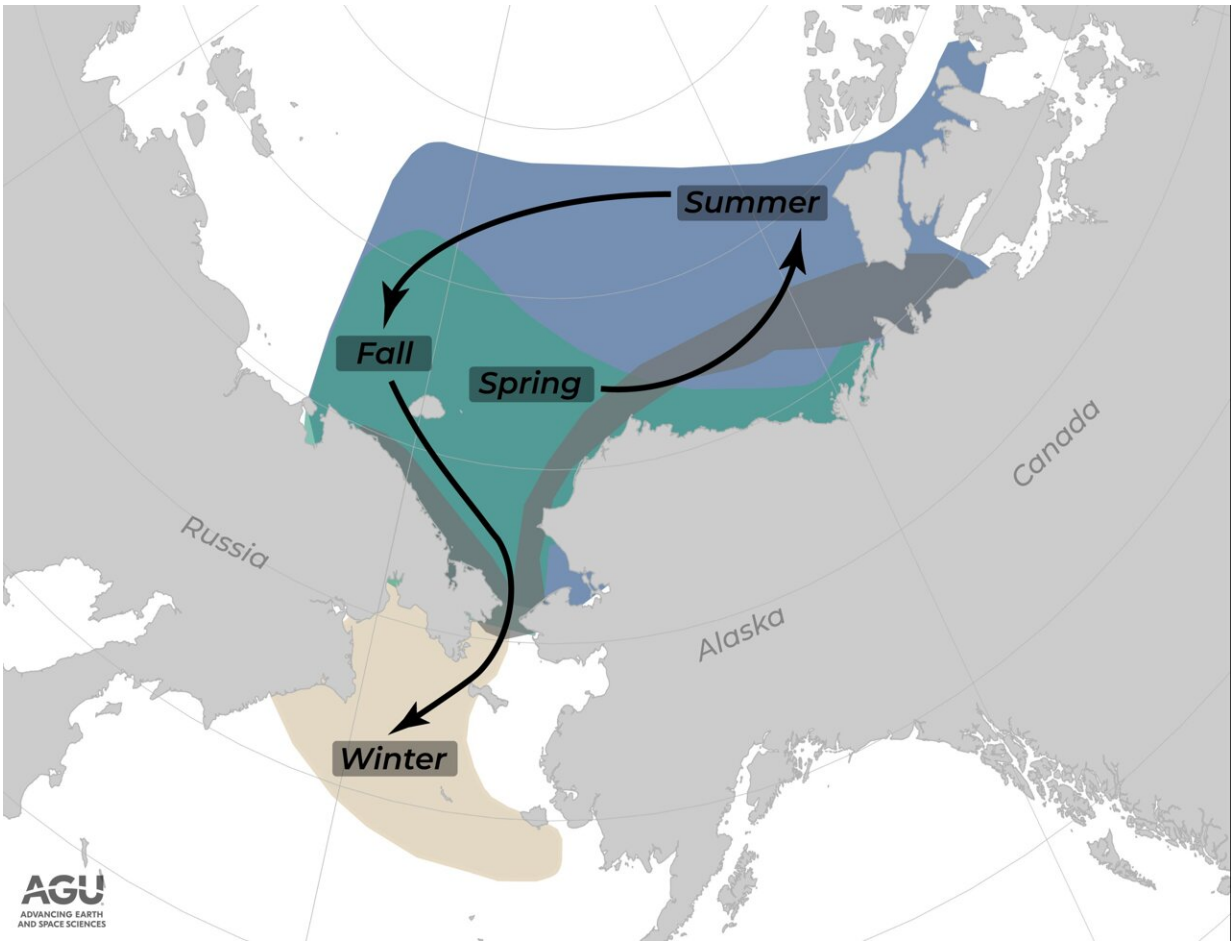
During the 2008-2009 International Polar Year, researchers put an underwater microphone called a hydrophone at the Chukchi Plateau for the first time and were surprised to hear bowhead whales in late spring and summer, much farther north than their previously understood migratory paths.

Traditional knowledge held in Indigenous Arctic communities has suggested the whales' [migration patterns](#) are changing in recent years, and data from a handful of satellite-tagged whales has reflected that. As temperatures warm the waters and sea-ice extent drops, the whole Arctic ecological web is forced to change, from tiny plankton and krill up to whales. Scientists wondered if [climate change](#) was behind the shift in bowhead whale migration patterns, but they needed more information on the whales' migration patterns over time to figure it out.

Szesciorka and her co-authors had [previously monitored](#) bowhead whale movements through the Bering Strait using data from hydrophones. They used hydrophones to monitor bowhead whales in the western Beaufort Sea and Chukchi Plateau from 2008 to 2022.

"Bowhead whales are highly vocal," Szesciorka said. "Males sing pretty much twenty-four-seven from fall through spring, so you know when they're there."

The recordings revealed that the whales shifted their winter departure time from the western Beaufort Sea 45 days later in 2022 than they had in 2008. They also spent more time in the summer in the Chukchi Sea, and some appeared to entirely forgo migrating back to the Bering Sea as they normally would.



Bowhead whales migrate from their usual overwintering spot in the Bering Sea, north through the Bering Strait, to summer feeding grounds in the Chukchi and Beaufort Seas. Recently, they’ve begun leaving the summer feeding grounds weeks later, with some whales not bothering to return to the Bering Sea winter spot, the GRL study finds. Credit: *Geophysical Research Letters* (2024). DOI: 10.1029/2023GL106416

Some of these changes are most likely due to increased [food availability](#) in the Chukchi Sea as a result of warmer waters and declining sea ice, the study suggests. But scientists will need to do more research to know for sure.

"The changes we are seeing in migration patterns lead to many questions," Szesciorka said. "How many whales are going to the Chukchi Sea in the summer? What are they feeding on? Do the same individuals return each year? We're essentially learning on the fly how whales are responding to changing climate."

There's also concern that Indigenous harvests of bowhead whales could be impacted. Bowhead whales could end up abandoning parts of their historic ranges, leaving some tribes with no access to this traditional food and cultural resource. Having tribal involvement in whale management is critical, Szesciorka said.

Seasonal shifts and ship strikes

Spending more time farther north, where commercial shipping traffic is increasing as sea-ice extent drops, could put the whales at increased risk of hazardous encounters with vessels.

"With this general northward shift paired with an increase in vessels and shipping, the threat of ship strikes will probably increase," Szesciorka said. Shipping in the western Chukchi Sea has increased about 13% since 2009; however, there hasn't yet been an increase in bowhead ship-strikes "that we know of," she emphasized. Ship strikes can only be confirmed during harvests; other whales may die and wash ashore undetected.

But Szesciorka sees opportunity.

"Right now, the Arctic is kind of the wild west," she said. "As sea ice continues to decline, shipping, especially large commercial vessels that go much faster than smaller fishing boats, is only going to increase. It's better to start thinking about this sooner rather than later so we can prevent problems rather than try to respond to them." One solution

would be to establish speed limits in bowhead whale seasonal habitat, reducing the risk of ship strikes and noise pollution, she said.

The shift in bowhead whales' seasonal movements is happening quickly, apace with the other rapid changes in the Arctic. But that's not necessarily a bad thing. The whales might be nimble enough to keep up with the changes, Szesciorka said.

"We saw these changes in migration patterns in just nine years," she said. "For a species that can live to 200, that's pretty stark. That shows they can adapt to their changing environments for now. But will there be a point where they can't adapt anymore? We have to wait and see."

More information: Angela R. Szesciorka et al, Basin-Wide Shift in Bowhead Whale Migration in the Pacific Arctic, *Geophysical Research Letters* (2024). [DOI: 10.1029/2023GL106416](https://doi.org/10.1029/2023GL106416)

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